In areas just starting to build a transit network, choosing the right corridor to construct first can support momentum for transit and TOD. Corridor planning that incorporates a strategic, region-wide analysis of the impact of transit can use the identification of where the real estate market will be most active to shape the corridor, its influence areas, and the entire city. Existing transit lines can also benefit from corridor-level TOD planning, especially if there is a need for community revitalization or the connection of job and housing areas. Corridors play important roles by integrating the regional and local contexts. Corridor level planning should precede station level planning.

Module Outline and Objectives

Objective: After completing this module, participants will be able to recognize different types of corridors. Examples of TOD corridors and lessons from the field will also be examined.

Outline
1. TOD corridor definition
2. Types of Corridors
3. Objectives for TOD at the Corridor level
4. Taste of TOD: examples from around the world

After completing this module, participants will understand what a TOD corridor is, and will be able to recognize the different types of corridors that exist. In addition, participants will be able to cite different examples of successful TOD corridor projects from around the world.

This module will begin with a discussion of the definition of a TOD corridor; this definition will include examination of the components necessary for a successful TOD corridor. The module will then provide a summary of the three different categories of TOD corridors, which include destination connectors, commuter corridors, and district circulators. Next, an overview of the common economic, social, and environmental objectives that cities hope to achieve through the creation of TOD corridors will be provided. Finally, specific examples of successful TOD corridor implementation from cities around the world will be discussed.
A transit corridor is a multi-modal transportation network centered around a major transportation facility, such as a road with a major bus line or rail line. It encompasses all surrounding land uses, and linked places together like pearls on a necklace. These places, or “nodes,” are comprised of existing destinations in a community—these linked places can be as large as a downtown, or as small as a street corner.

Different transit technologies determine different areas of influence. For example, the immediate area of influence along light and heavy rail corridors is typically 800 meters around stations which is walkable. The area of influence can be expanded by the secondary feeder transit services (mainly bus) seamlessly connected with the transit station. Any transit technology can create a transit corridor – heavy or light rail, streetcar, trolley, or bus. Potential for TOD depends as much on the design and quality of transit service as it does on the type of transit technology used. High-quality service for all transit technologies is defined as safe, comfortable, punctual and high-frequency service along dedicated lanes or rights of way that serve to ‘fix’ the location of a transit line and provide certainty for investors that transit service will not be moved to another corridor. TOD potential is also determined by the walkability and bikeability of station areas, the presence of commercial and retail amenities, public facilities and the local housing and/or office market.
City officials can use many factors to determine the optimal location of transit corridors. A primary factor used to choose transit corridor location is population and employment concentration, as city officials hope to design transit corridors that will be accessible to a maximum number of people. Transit corridors can also be used as tools for neighborhood revitalization, as is the case for Boston’s Fairmount Indigo transit corridor. Currently in its planning stage, the Indigo commuter rail line will serve neighborhoods that have historically been home to many of Boston’s low-socioeconomic and minority populations. While these neighborhoods have long had poor access to public transit, this corridor will provide a high-quality link for residents to economic opportunities located in the city center. City officials hope that installation of this transit line will lead to neighborhood revitalization.

Source:

What makes a transit corridor successful? When a corridor is developed successfully, the transit system will serve to unite adjacent communities. Successful corridors adapt to the context of each community, and are accessible to drivers and non-drivers alike. In contrast, failed corridors can divide communities, spawn debilitating congestion, and create visual blight.

Successful corridors often exhibit many of the following attributes:

- Serve as the backbone of the city, shaping its transportation network and spatial structure
- Promote a community’s long-term goals: Every community has a vision for itself, even if it has not been officially articulated as policy. In successful corridors, the transportation network serves to further that vision.
- Offer a variety of land uses: Successful corridors provide a range of housing choices, retail stores, and commercial space that serve the local community.
- Offer a diverse and connected network of transportation choices: Driving is not the only option. In town, people can walk or bike; in between neighborhoods, they can use transit. People can enjoy an opportunity to choose from a variety of routes and modes thanks to a connected network of streets, trails, and transit facilities.
- Provide community destinations: Compact neighborhoods with a mix of land uses allow
people to walk or bike for local trips, while making public transit more feasible for travel between destinations. Some of the land around these destinations should be preserved as open space.

• Connect centers of demand: Corridors are successful if they naturally connect 2 or more major nodes of trip demand (i.e. business cluster, shopping district, etc.)
• Incorporate community input: Ongoing input from the community guides the growth of successful corridors. The community’s vision is actively implemented through new initiatives to address issues and concerns that arise.

Source:
Structuring transit and TOD investments around corridors can help integrate regional and local contexts.

Just as transit corridors are planned as part of a broader regional transportation network, TOD planning, which is typically done through station area plans or even parcel by parcel, should also happen at the broader corridor scale. Optimizing the potential for TOD at individual stations requires consideration of each station’s role relative to other stations along the corridor. When planning occurs at the corridor level, city officials have the added benefit of seeing how stations along the corridor can form connections that will maximize ridership and TOD opportunities. For example, some stations might be envisioned as office and commercial hubs, while others might be predominantly housing. If the unit of analysis is the corridor, not every station area is required to have all land-uses.

Considering the corridor scale may also help planners revisit decisions about planned alignments in order to make a corridor more functional. When local planners consider TOD at the corridor scale, they can enhance their understanding of how transit will influence the TOD, ridership, and market potential at each station. When planners only consider the station area, they can miss this important broader context.

In addition, corridor-level planning can help regional planners understand the specific infrastructure or programmatic improvements that are needed to improve local access for
residents to the entire transit system. For example, streetscape improvements and bicycle connections may need to be provided at each transit station along a corridor in order to make “last mile” connections.

Corridor-level transit planning and construction can cause both excitement and anxiety in residents of neighborhoods located along a planned corridor. As a result, transit planning at the corridor scale can bring people to the table who otherwise might not pay attention to planning at a smaller scale.

This provides an opportunity to get a broad array of stakeholders invested in the success of a transit corridor, and can create powerful momentum for TOD implementation. When residents are engaged in planning for an entire corridor, they are more interested in decisions about transit alignments and location of stations. If developers are involved in a project, they can provide transit agencies with a better understanding of where the best opportunities for transit-oriented development are located, and how decisions about the alignment and location of stations will help the market. Additionally, a range of city officials from multiple neighborhoods and districts can create a broader political alliance of support.

Source:
Planning and implementing TOD requires a significant investment of public and private resources. Corridor planning for TOD allows public agencies to phase investment over time, beginning with stations that have higher potential for TOD in the short term. This can send a strong signal to developers to activate the private development market.

Many station areas are likely to require similar implementation planning; strategies such as transit-friendly land-use ordinances, revamped parking standards, and additional methods designed to reduce barriers to development can be used to encourage TOD. It is more efficient to implement these changes along an entire corridor rather than station by station.

Corridor planning also makes it easier to identify what amenities, densities, and types of land-use already exist along a corridor, and which ones are lacking. It is not always possible to provide all amenities at all station areas, but these amenities can be located at different stations along the corridor, ensuring that residents have access to public services through transit.

Corridor types are defined by what they connect and how these connections influence the overall potential for TOD. Different corridor types create different TOD opportunities. While this categorization of types serves to advance corridor analysis and planning, real transit corridors cannot be so easily categorized and tend to be a mix of different categories. In this module, we will broadly classify TOD corridors into 3 different categories: destination corridors, commuter corridors, and district circulators.

The image on this slide provides an example of a transit corridor located in Denver, Colorado, USA. As can be seen on the map, this transit rail line runs through residential, commercial, and mixed-use areas. Planning for this corridor took into account intensity of this residential or commercial classification, thus contributing to future strategic phasing of stations.

Mass transport services are also usually complemented by feeder transport that provides last-mile connectivity (or 1.5 km connectivity), which expand the influence of trunk corridors. In general, there are four distinct types of feeder modes: non-motorized modes (i.e. walking, cycling), intermediate public transport (i.e. taxis, rickshaws), shared-ride services (i.e. shared taxis), and buses. The prominence of the feeder services for each type of corridor varies. In dense districts, such as central business district areas, non-motorized transportation and intermediate transport is key. In more residential and
suburban areas, or areas where stations area located further away from each other, feeder services are more important.

On the following slides, definitions of the three different types of corridors will be given.
The first type of corridor that we will discuss is the destination connector.

Destination connectors link residential neighborhoods to multiple activity centers, including employment, medical, commercial, academic centers and leisure facilities. Destination connectors encourage ridership in both directions throughout the day because they link employment centers and other destinations. These types of corridors can also serve as commuter corridors.

Destination connectors have multiple implications for TOD. Along a destination connection corridor, the demand for new development will likely be highest in those station areas that are considered to be ‘destinations;’ this can lead to an influx of high-density, mixed-use development in these destination areas. While demand for development might be highest in the most desirable destination areas, high-density development can be encouraged all along a destination connector, as there will be increased market demand for locations with access to job and activity centers.

These types of corridors are very advantageous for transit services, as the balanced demand allows more efficient transit operations with less empty services being run as there is no clear “offpeak” direction.
Source:
Another corridor type is the commuter corridor.

Unlike destination connector corridors, commuter corridors generally serve only one major activity center – typically a central business district – with riders traveling into the CBD in the morning and out of the CBD at the end of the day. Heavy rail is the transit technology most often used for commuter corridors, but they can also be served by light rail and bus services. Transit service along commuter corridors is moderate to high-frequency during peak commuting hours, and tapers off during off-peak commuting hours.

The existence of a commuter corridor has many impacts on the implementation of TOD. New development along commuter corridors tends to be residential, and can be of moderate or high-density. Because commuter corridors typically connect residential, suburban areas to downtown districts, a major challenge for TOD implementation along these corridors is creation of mixed-use development. In order to successfully implement TOD, mixed land-use could be explored; for example, housing options can be added in the CBD and small downtown areas can be created in suburban station areas.

District circulators are the final type of corridor that will be discussed in this course.

District circulators facilitate movement within an “activity node” – typically a downtown or a commercial, medical, or educational center. Circulators extend the walkability of these districts, making it easier to access amenities without a car. Circulators can also connect neighboring activity nodes.

Circulators are a good fit for TOD developments for the following reasons:

• They can promote biking, walking, and “park once” strategies (encouraging walking through the strategic placement and pricing of parking). Streetscape improvements such as wider sidewalks, trees, benches, and other amenities will encourage pedestrian activity within a district.
• District circulators can be a key component of a district-wide parking plan, making it possible to decrease parking ratios and boost retail sales without providing more parking spaces.
• Circulators can increase overall transit ridership in the region if they connect to a larger transportation network.
• District circulators are a good strategy by which to attract market-rate development when they connect important destinations with land that is
available for development.

When implementing a TOD corridor, cities seek to achieve a number of ambitious goals; these goals can include reducing traffic congestion, stimulating the local economy, making a city more inclusive for its most vulnerable populations, guiding real estate development, and creating a more sustainable city.

But how can cities achieve these goals through the creation of a TOD corridor? And what specific tools can cities use to create a vibrant TOD corridor?

In the next slides, we’ll briefly introduce some strategies that cities can use to achieve these goals at the corridor-level.
First, let’s look at some of the actions that cities can take to guide urban growth and real estate development.

Corridor TOD planning helps stakeholders understand how transit can influence the real estate market around stations and deliver the benefits of smart, compact growth. Transit alone does not create a new market for development; however, a strong market at one station area can help attract new market activity at other station areas along the same corridor. Transit corridors that connect activity centers to station areas with development opportunities are the most likely to see significant new development.

If the market is strong around station areas where there is little land available for development, the pent-up demand at those stations may move to neighborhoods around the next stations on the transit line – if local conditions encourage it. Adjacent stations that provide significant land opportunity and sites that are attractive because of their size, price, or surrounding neighborhood and amenities are likely to attract the most development.

Sources:

Cities can also design TOD corridors to spur economic growth.

Traffic congestion and longer commutes threaten the economic strength of metropolitan regions. Increased density near mass transit corridors, as proposed by TOD, can help solve the problem of congestion and boost the local economy by providing additional commercial space with improved accessibility. Construction of mixed-use development in station areas benefits both local residents, as new job opportunities are created, and business owners, as businesses are accessible to a greater number of customers when located by transit. TOD transit corridors can also support continued economic growth by connecting previously isolated areas to centers of employment, offering residents improved access to economic opportunities.

In addition, when TOD is successfully implemented along a transit corridor, mixed-use development will be located along the corridor, centered around station areas; commercial and retail businesses will be clustered around these stations. In what is known as economies of agglomeration, these businesses can receive economic benefits from being clustered together.

In order to design a TOD corridor that supports the local economy, city officials must take regional and local contexts into consideration during the initial planning stage. City officials
must identify and map key destinations along a potential corridor, including job centers, residential areas, public services, and commercial destinations. Officials can then design the corridor to connect these locations. In addition, officials can plan high density, mixed-use development in station areas to help businesses achieve the positive outcomes of economies of agglomeration.

Source:
City officials can also utilize TOD corridors to encourage local economic development and neighborhood revitalization and redevelopment.

Corridor planning for TOD can leverage significant economic development and investment along older commercial corridors that are transitioning to more intensive use. The focus in these corridors is typically on smaller-scale development, as the only available land in older, built-out neighborhoods consists of small parcels. Corridor planning that maximizes development potential and access to transit networks can provide reduced transportation costs for residents, who can spend the money on local goods and services instead; this creates a positive cycle of reinvestment in the local economy.

Policies that support economic redevelopment along a TOD transit corridor might include:

- Local hire requirements or training programs that make transit construction beneficial for residents
- Tax breaks and other incentives to encourage businesses to move to sites near the corridor
- Business improvement districts or tax increment financing (TIF) districts to help revitalize specific districts
- Strategies to support local merchants and small businesses that may be forced to
relocate due to transit construction and neighborhood redevelopment
• Shared parking and other strategies that will preserve access to local businesses during and after construction and ensure that local deliveries can be made

Through the implementation of TOD corridors, cities can become more inclusive and equitable.

Transit typically serves economically and socially diverse populations. Connecting lower-income neighborhoods to job centers enhances equity by increasing access to economic opportunity and public services and by reducing transportation costs for residents. However, because the demand for housing often increases in neighborhoods where the introduction of transit improves access to jobs, low-income residents who live in these places can be displaced when rents and housing prices increase; this process is known as gentrification. This risk is particularly great in older neighborhoods that are built out and have limited land available for new housing or commercial development.

Every corridor requires a different approach in order to be made more inclusive. However, in order to ensure the creation of an inclusive transit corridor, two specific strategies are necessary for implementation. To limit gentrification, the overall number of affordable housing units should be preserved in neighborhoods that could face increased market demand, and resources for new affordable housing should be targeted to neighborhoods around stations along the corridor. In addition, it is important that all residents along a corridor should be able to access the benefits resulting from a major transit investment, but including last mile connectivity services.
Policies should be established to support the creation of affordable housing, mixed-income development, and accessible transit for residents. Such policies can include those that support development of affordable housing and provide subsidies for new affordable units, and those that improve access to transit through better street design and streetscape improvements. We’ll look at these types of strategies in detail in Module 7 of this course.

Source:

Finally, cities can use TOD corridors to improve sustainability through the reduction of air pollution and overall GHG emissions.

Transit-oriented development and transit corridors can play a substantial part in reducing air pollution and greenhouse gas emissions by decreasing automobile dependency. Because TOD offers a strategy for compact, high-density development, it provides an opportunity to reduce household vehicle travel, thereby decreasing a city’s air pollution and carbon footprint. Cities can also reduce automobile use by improving access to transit corridors; if made accessible and reliable, residents are more likely to use public transit options.

A study by Center for Transit Oriented Development (CTOD) conducted in Chicago, Illinois illustrates how a household’s access to transit corridors, or lack thereof, impacts their carbon footprint. According to the model created in this study, a household in suburban Chicago with no access to transit would be expected have an average carbon output related to vehicle miles travelled of 7.15 tons of CO2e per year. In contrast, a household located downtown, with access to reliable public transit, was calculated to have an average VMT-related carbon output of only 4.07 tons; this represents a 43% reduction in emissions. Improved access to transit is needed to reduce automobile dependency and achieve such reductions in emissions.
Source:
Let’s turn now to look at specific examples of TOD corridors from around the world.

The city of Portland, Oregon has one of the most successful examples of TOD corridor implementation in the United States. When designing transit corridors, Portland’s city planners utilize different station area typologies; station areas are designed in different ways to fit local contexts. The typology of a station area is determined by that area’s transit orientation, a factor based on a station’s urban form and its potential real estate market strength.

As of 2015, 35 TOD station projects had been created along transit corridors in Portland; 3,000 residential units were constructed within the areas of influence of these transit corridors. In addition, approximately 400,000 sq ft of commercial space had been developed, helping to fulfill TOD’s goal of mixed land-use. These numbers indicate the success of Portland’s transit corridors and TOD implementation, success due, in part, to city planners’ willingness to optimize station areas for local contexts.

Another example of a plan for a corridor level TOD project can be found in Surabaya, Indonesia. The Surabaya Urban Corridor Development Program is a transit and pedestrian-oriented development built alongside an 18 kilometer tram corridor.

Through spatial mapping and economic assessments, city officials identified expansion needs and opportunities, creating economic clusters near station areas along the corridor. The TOD Corridor analysis also identified locations for riverfront development along the corridor, providing opportunities to enhance the city’s networks of public spaces. Regulatory and planning reforms were proposed to encourage high-density construction and economic development at strategic locations.

Image Source:
The city of Singapore offers another excellent example of TOD corridor planning and implementation. Since their establishment in the 1970s, Singapore’s transit corridors have shaped the way in which the city has grown and have allowed Singapore to become the compact and socially inclusive city it is today.

Singapore’s first Concept Plan, created in 1971, laid the foundation for the city’s long-term urban development plan; this Plan included TOD principles in the form of a ring-shaped city concept. By 1991, this plan had been revised into what is known as the ‘constellation plan,’ a plan in which employment, commercial, and residential nodes on the periphery of the city are connected to the city center through transit corridors.

Through the integration of land use and transportation development, urban planning in Singapore focuses on diverse, dense, and mixed land uses and services, vibrant public spaces, and access to employment opportunities and public transport.

Source: Singapore Land Transport Authority, 2008
The Rosslyn-Ballston Metro Corridor of Arlington, Virginia, located in the Washington, D.C. metropolitan area, represents an additional successful example of TOD corridor development.

Arlington’s planning department started to focus on capturing development opportunities from Washington Metrorail transit as early as the mid-1970s, when a new transit corridor was constructed to link Arlington to Washington, D.C. Arlington planners implemented a “Bull’s Eye” planning strategy, concentrating high-density development closest to transit stations along the entirety of the three mile-long corridor. Using this strategy, planners hoped to encourage high-density, mixed-use residential, commercial, and office development, promoting a balance of opportunities near transit.

Over the past 40 years, Arlington has seen significant TOD growth; the amount of retail space has increased more than three-fold, the number of office developments and built residential units have each grown by about four times, and estimates of the number of area jobs have grown to more than four times their 1970 numbers. In addition, between 1990 and 2000, the total population of Arlington doubled within half-mile radius of transit stations along corridor.
The Empire-Perth Avenue BRT Route in Johannesburg, South Africa, will be our final example of a successful TOD corridor. This BRT route connects the suburban township of Soweto to the city center; it has provided residents of Soweto with increased economic opportunities through improved access to jobs downtown. High-density development has been focused along the transit corridor, while public services and amenities have been concentrated in station areas for easy access. Additionally, mixed-income housing requirements have been included in development planning; this has created increased opportunities for low-income residents of Johannesburg.

Module Quiz

1. What determines a transit corridor’s area of influence?
   a. Regulations and zoning codes
   b. Placemaking strategies
   c. Last mile connectivity
   d. Transit technology

2. Which of the following is an important reason to plan TOD at the corridor-level?
   a. TOD planning at the corridor-level is more efficient because it allows for the elimination of multiple stakeholders from the TOD planning process.
   b. TOD planning at the corridor-level allows planners to integrate local and regional contexts by enabling them to envision how stations along the corridor will form connections.
   c. TOD planning at the corridor-level guarantees private sector investment.
   d. TOD planning at the corridor-level ensures that private developers will create mixed-income housing.

5. As discussed in this module, in which city was the constellation plan used to implement TOD corridors?
   a. Johannesburg, South Africa
   b. Singapore
   c. Portland, Oregon
   d. Surabaya, Indonesia

Answers
1. c
2. b
3. b
Module Quiz

4. City officials in Buenos Aires, Argentina, hope to redevelop an economic district in the city center. Which of the following strategies can they use for economic revitalization? Select all that apply.
   a. Placemaking Strategies
   b. Creation of a Business Improvement District
   c. Improved access to transit
   d. All of the above

5. Which is a characteristic of Destination Connectors?
   a. Link residential neighborhoods to multiple activity centers
   b. Serve only one major activity center with moderate to high-frequency peak hours
   c. Facilitate movement within activity nodes extending district walkability
   d. Connect neighboring activity nodes

Answers

4 d
5 a